in people with osteoarthritis of the knee joint. A frequent consequence of knee joint osteoarthritis is quadriceps muscle weakness. Such weakness can contribute to disability and diminished levels of function. Safe and accurate methods of measuring maximal strength are required to quantify quadriceps strength deficits, and be able to subsequently set appropriate training prescriptions. While the 1RM technique is frequently used in athletic training to measure maximum strength, a major limitation in clinical situations is the load that it imparts upon the knee joint and the possibility of causing pain and swelling. Equations for estimating 1RM from repetitions completed at sub-maximal loads have been developed. Unfortunately, no research has been conducted on these prediction equations in persons with osteoarthritis. If these prediction methods were an accurate measure of 1RM in this cohort, they would provide a useful tool for the prescription of muscle strengthening programs.

**Methods:** Twenty five subjects with OA of the knee joint volunteered. Each subject attended a rehabilitation gym on three occasions: (1) a familiarisation session, then after randomisation, (2) a session where the actual or 'true' 1RM of the quadriceps was established using a weights machine for an open chain knee extension exercise and a leg press exercise, (3) a session where the subjects performed with a load at which they could lift approximately 10 repetitions before fatiguing. The data from this latter session was used in twelve prediction equations to calculate 1RM strength. Subsequently, these data were compared to the actual 1RM data.

A paired t-test was used to compare the difference scores (predicted 1RM - actual 1RM) across the injured and control limbs. Data were plotted using Bland and Altman graphs, enabling an appreciation of the distribution of error between the 1RM and that predicted by each equation. Intraclass correlation coefficients between actual 1RM and the respective 1RM prediction methods were calculated. Typical Errors were calculated using the standard deviation of the difference scores (predicted 1RM - actual 1RM).

**Results:** For the knee extension exercise, the Brown, Brzycki, Epley, Lander, Mayhew, Poliquin and Wathen prediction methods demonstrated the greatest levels of predictive accuracy. Of these, the Poliquin table was consistently the most accurate prediction method. No significant differences in predictive accuracy were found for any of the equations across the affected and control limbs ($p > 0.05$). Bland and Altman graphs for all equations showed a low level of bias and random scatter across the range of data. All ICCs were high (range: 0.95-0.99), and Typical Errors ranged from 2-3%.

For the knee press exercise, the Adams, Berger, KLW, and O'Connor equations demonstrated the greatest levels of predictive accuracy with no one method being notably better across all the statistical tests. No significant differences in predictive accuracy were found for any of the equations across the affected and control limbs ($p > 0.05$). Bland and Altman graphs for all equations showed a low level of bias and random scatter across the range of data. All ICCs were high (range: 0.95-0.99), and the Typical Errors ranged from 5.0-6.0%.

**Conclusions:** This study provided evidence supporting the use of prediction equations to assess maximal strength for machine weight knee extension and leg press exercises in individuals with an OA knee joint. As knee extension and leg press are commonly employed in strengthening the quadriceps muscles, these findings are valuable to clinicians involved in exercise rehabilitation.

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## EFFECTS OF TWO EXERCISE APPROACHES ON SELF-REPORTED KNEE INSTABILITY IN SUBJECT WITH KNEE OSTEOARTHRITIS

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**Purpose:** Self-reported knee instability is a common problem in people with knee osteoarthritis (OA) and has been shown to be associated with functional deficits. There have been no reports on how exercise approaches may affect self-reported instability in people with knee OA. Adding agility and perturbation (A&P) training (wobble and rollerboards, quick changes in directions, stops and starts, etc.) to standard exercise programs has been shown to improve self-reported knee instability in ACL deficient patients, but this has not been tested in people with knee OA. The purpose of this report is to compare the effectiveness of a standard exercise program (lower extremity strength, stretching, aerobics) to the same exercise program supplemented with A&P training in improving complaints of self-reported knee instability in subjects with knee OA.

**Methods:** Fifty three subjects (39 female, Age = 63±9 yrs, Height = 166±8 cm, Weight=87±22 kg) with knee OA and with a grade of $\leq 3$ on the Knee Outcome Survey Self-Reported Instability item (KOS-SRI) (5 = no instability, 4 = instability present but does not affect function, 3 = instability minimally affects function, 2 = instability moderately affects function, 1 = instability severely affects function) participated in the study. Subjects were randomized to one of two exercise approaches: Standard exercise group (SG) or A&P training plus standard exercise group (APG). Subjects received 12 supervised sessions of their respective exercise programs and then were given an independent home exercise program thereafter. Subjects repeated the KOS-SRI ratings at 2, 6, and 12 months following randomization. Subjects were considered IMPROVED if they increased the KOS-SRI rating by at least 1 level or NOT IMPROVED if there was no change or decreased the KOS-SRI rating by at least 1 level from baseline to the follow-up test sessions. A Chi-Square analysis was performed to determine if there was a difference between exercise groups in the proportion of subjects that improved their KOS-SRI ratings at each follow-up period.

**Results:** There were no differences between exercise groups in the proportion of subjects who improved their KOS-SRI ratings at any of the follow-up periods (see Table 1). However, when the data from both groups were combined, there was a significantly greater proportion of subjects who improved the KOS-SRI rating at the 6 month and 12 month follow-up periods (see "Total" rows in the able).

Table 1. Comparison of Improved Vs Not Improved Knee Instability Between Groups (*p<.05)

| | | Not Improved | Improved | $\chi^2$ |
|---|---|---|---|---|
| 2 month | SG | 9 | 16 | – |
| | APG | 12 | 16 | 0.26 |
| | Total | 21 | 32 | 2.28 |
| 6 month | SG | 9 | 14 | – |
| | APG | 8 | 19 | 0.50 |
| | Total | 17* | 33* | 5.12* |
| 12 month | SG | 5 | 13 | – |
| | APG | 10 | 16 | 0.31 |
| | Total | 15* | 31* | 5.56* |

**Conclusions:** Supplementing a standard lower extremity exercise program with A&P training techniques has no additive effect in improving self-reported knee instability. In general, participating in a lower extremity exercise program, with or without A&P training may increase the likelihood of improving complaints of self-reported knee instability.